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A  
PROBATIONARY ESSAY  
ON THE  
MORBID ANATOMY  
OF THE  
URINARY BLADDER,  
SUBMITTED  
BY THE AUTHORITY OF THE PRESIDENT  
AND HIS COUNCIL,  
TO  
THE EXAMINATION  
OF  
*The Royal College of Surgeons  
of Edinburgh,*  
WHEN CANDIDATE,  
FOR  
ADMISSION INTO THEIR BODY,  
IN CONFORMITY  
TO THEIR REGULATIONS  
RESPECTING  
*The Admission of Ordinary Fellows.*

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BY  
DAVID CLARK, M.D. SURGEON.

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DECEMBER, 1818.

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TO

JOHN ABERCROMBIE, Esq. M.D.

FELLOW OF THE ROYAL COLLEGE OF SURGEONS,  
EDINBURGH.

DEAR SIR,

*As the present may perhaps be the only opportunity which shall ever be in my power of so publicly testifying my gratitude for the innumerable obligations under which your kindness has laid me, I therefore perform an act no less of duty than of love, in dedicating the following pages to one who exercises such a paternal influence on all who have the felicity to be connected with him, and who is so filially beloved by them ; and, I trust, by none more so, than by*

*His most affectionate Pupil,*

DAVID CLARK.

December, 1818.

THE HISTORY OF THE

REIGN OF THE GREAT QUEEN OF SWEDEN

CHARLOTTE

1745

The first volume of this history was published in the year 1745, and was immediately received with great applause. The second volume, which contains the history of the year 1746, is now published, and is equally well received. The third volume, which contains the history of the year 1747, is also now published, and is equally well received. The fourth volume, which contains the history of the year 1748, is also now published, and is equally well received. The fifth volume, which contains the history of the year 1749, is also now published, and is equally well received. The sixth volume, which contains the history of the year 1750, is also now published, and is equally well received. The seventh volume, which contains the history of the year 1751, is also now published, and is equally well received. The eighth volume, which contains the history of the year 1752, is also now published, and is equally well received. The ninth volume, which contains the history of the year 1753, is also now published, and is equally well received. The tenth volume, which contains the history of the year 1754, is also now published, and is equally well received.

Printed by J. DODD, in Pall-mall.

1755

Vol. I.

Professor Hamilton with Cor.

from

The Author.

AN  
ESSAY  
ON THE  
MORBID ANATOMY  
OF THE  
URINARY BLADDER.

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IN considering the Morbid Anatomy of any part of the human body, a correct knowledge of the part, or parts, in the healthy state, is presupposed; but, for the sake of connection, I shall here give an outline of the anatomy in the healthy state of that part which I intend to consider, viz. the Urinary Bladder—previous to entering upon it in the state of disease, which more peculiarly forms the subject of this paper.

The urinary bladder, then, is a hollow vis-



cus, situated in the anterior and inferior part of the pelvis, in the healthy state capable of containing about two lbs. of urine ; but when morbidly distended, as in the retention of urine from paralysis, it has been known to contain 22 lbs.\* When seen out of the pelvis, and unconnected with the neighbouring parts, as in dried preparations of it, it is generally of an oval shape, but in situ, on account of its connections and pressure of the surrounding parts, has more of a triangular appearance. It is divided into body, atlantal and sacral fundus and neck ; is connected superiorly by the urachus and umbilical arteries to the anterior and inferior parietes of the abdomen ; anteriorly, to the symphysis pubis ; and posteriorly, to the rectum in the male, and uterus in the female, by fat, loose cellular substance, and ligaments. These ligaments are chiefly formed by the peritoneum ; but the peritoneum has a more extended and important connection with the bladder. It covers one-third of it ; is reflected to it anteriorly from the abdominal

\* Lieutaud, Obs. 1258.

muscles ; covers its superior anterior part ; all its atlantal fundus ; descending on its posterior part till it reaches the vesiculæ seminales, and is again reflected on the anterior part of the rectum in the male, and uterus in the female. It is evident from this, that the peritoneum is only a partial covering to the bladder, the sacral fundus, and the two places of reflection being destitute of a covering from it. But besides this partial coat, it has two complete ones, a muscular and a mucous. The muscular coat surrounds the whole of the bladder, is pretty strong, and the fasciculi run in various directions ; at the atlantal part they chiefly take a longitudinal direction, on the sides a circular, and at the sacral fundus they cross in all directions. This coat is very irritable, and has been called *Detrusor Urinæ*. Towards the neck, which is situated at the anterior and inferior part of the bladder, the circular fibres are strengthened, and embrace the beginning of the urethra, forming a sphincter ; the muscular fasciculi have numerous interstices, through which the next coat may be seen, viz. the mucous or internal coat ; it is smooth and

firm, lines all the internal surface; when the bladder is distended, no irregularities are to be observed in it, but when contracted, it falls into rugæ. Portal\* considers this coat as only dense cellular substance; a mucus is secreted from its surface, which defends it from the irritation of the urine, and when formed in great quantities, constitutes the disease called Catarrhus Vesicæ; this mucus has been supposed to take its origin from numerous small glands which have been said to be found covering this coat.† There is a part of this inner surface of the bladder which the French call Trigone, and which, although it is delineated by several anatomists, is described by few; it is rather whiter and harder than the rest of the bladder—is bounded before by the opening of the urethra, and, posteriorly and laterally, by the opening of the ureters; the inner coat is very intimately connected with it. Portal‡ thus describes it: “Quant a la partie inferieure de ce sac, elle

\* Cours d'Anatom. Medical, Tom. v. p. 398.

† Diction. des Sciences Med. Art. Cystitis. Winslow, &c.

‡ Cours, &c. Tom. v.



est adhérente à un corps triangulaire de consistance cartilagineuse, lequel est toujours un peu saillant dans la cavité vésicale, mais sur-tout dans la vieillesse : Lieutaud a donné à cette partie de la vessie le nom de trigone.

“ Des trois bords qu’on y observe, deux sont latéraux, et le troisième est postérieur et le plus court ; ces trois bords sont terminés par autant d’angles dont deux sont postérieurs ; le troisième est antérieur. On remarque à chacun des deux angles postérieurs, l’ouverture oblongue des urétères, et quant à l’angle antérieur du trigone il est surmonté d’une éminence un peu plus saillante, à laquelle Lieutaud a donné le nom de *luette*. Cet anatomiste a cru que le trigone avoit un peu moins d’étendue chez les femmes que chez les hommes ; mais nous ne nous sommes pas convaincus de cette différence.

“ Il y a une union très-intime entre la membrane interne de la vessie et le trigone. Cette union se fait par divers trousseaux de fibres en forme de ligamens ; mais on n’y voit aucune fibre musculaire d’où il doit résulter que, dans cet endroit, la vessie n’est pas susceptible de contraction, et par conséquent que les ori-

fices des urétéres ne peuvent être rétrécis par la contraction même la plus fort de la couche musculaire ; ce qui fait que l'urine peut couler sans interruption dans la vessie." These three coats are connected with each other by means of loose cellular substance ; that between the mucous and muscular coat, being more condensed than the other, has by some been described as a fourth coat.

Having described the coats of the bladder, we shall now examine it more particularly externally. Attached to its sacral fundus we find two soft bluish white knotted bodies, enveloped in cellular substance, and partially covered by the fibres of the levator ani muscle, about four fingers breadth in length, and one in breadth ; these are the *vesiculæ seminales* : they are formed of a tube coiled up, which, on being dried and cut into, presents a cellular appearance ; but this is owing to the distortions of the canal, and the duplication of the inner membrane ; they converge and meet at an acute angle behind the prostate gland. This is a gland surrounding the neck of the bladder, and about half an inch of the beginning of the urethra ; it is of a pyramidal shape, with



its base towards the bladder, and the apex towards the urethra ; it is of a fibro-cartilaginous structure, and has three lobes, two lateral, and one in the middle, which slightly projects. Mesial to the vesiculæ seminales are seen the vasa deferentia, or excretory ducts of the testicle ; these run parallel to the vesiculæ, and join them where they are imbedded in the prostate gland. The bladder of the female wants this gland. Behind the vesiculæ seminales, and a little to the outside, are seen two other tubes ; these are the ureters, or excretory ducts of the kidneys, which, descending from them on the surface of the psoas muscle, enter the bladder obliquely between the muscular and mucous coats at the superior and posterior angles of the triangular space near the neck, formerly described under the name of the trigone vesicæ ; and upon examining this point from the inside, their mouths may be seen ; by the obliquity of their insertion, the urine which they transmit is prevented from returning. The peritoneum, although it descends on the posterior part of the bladder as far as to touch the vesiculæ seminales, and is reflected from

these to the rectum, yet descends lower in the interval between them, so that its inferior connection is by a semicircular line, the convexity of which looks towards the neck. A fascia lining the walls of the pelvis from the sacro-sciatic notch and linia ilio-pectinea, descends mid-way in the depth of the pelvis, and is reflected from the surface of the muscles to the prostate gland, neck of the bladder, and membranous part of the urethra, binding these parts firmly to the arch of the pubis.\* Behind the attachment of this fascia to the pubis, the under ligament of the bladder extends from its neck and from the prostate gland to be fixed to the inner side of the symphysis pubis. The posterior ligaments are reduplications of the peritoneum, extending from the inferior and posterior part of the bladder to the sides and anterior part of the rectum. The bladder is farther connected to the bones of the pubis by the fibres of the levator ani muscle which surround its neck, the extremity of the rectum,

\* For a more particular description of this fascia, see Colle's Surgical Anatomy, Part I., and Dr Gairdner's Probationary Essay, p. 17.



all the prostate gland, and part of the vesiculæ seminales. Mr Charles Bell describes the cellular substance at the anterior part of the bladder, where it is a little condensed, under the name of the fascia vesicalis. The bladder is chiefly supplied with blood from the hypogastric, umbilical, common pudic, obturator, and hæmorrhoidal arteries; its veins are more numerous and larger than the arteries, and form numerous plexuses, particularly at the sacral fundus, and between the loose cellular substance and the fat, at the anterior and posterior reflections of the peritoneum. The nerves are from the hypogastric plexus.

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#### I.—INFLAMMATION OF THE BLADDER.

Inflammation being commonly connected in some manner or other with most of those changes which a part undergoing diseased action takes on, it in a peculiar manner obtrudes itself on our notice as a primary object of attention. It may be either of the

phlegmonous or erysipelatous\* kind, and may terminate in adhesion, suppuration, gangrene, or ulceration. It may either be acute or chronic. When acute, it generally arises from wounds, blows, retention of urine, too large doses of cantharides, metastasis, &c. When chronic, from calculi, or other foreign bodies. It may attack any or all of the coats of the bladder; when it attacks the peritoneal, it renders it thicker, more pulpy, less transparent, and crowded with small vessels containing red blood; it very seldom attacks this coat primarily,† but commonly spreads to it from the internal coat. The occurrence of this latter circumstance is considerably retarded by the loose cellular substance intervening between the coats.

The mucous coat is the one most frequently diseased or inflamed, the muscular only becoming so by the spreading of the inflammation from either of the other two coats. The effects of inflammation on this coat are,

\* Lieutaud, *Observ.* 1567.

† See a case of inflammation attacking the peritoneal coat of the bladder from a blow, in Dr Sievwright's *Thesis*, "De Cystitide," Edin. 1815.

thickening, induration, ulceration, and suppuration. The inflammation may either be partial or complete; in the former case, it is commonly situated at the neck; in either, numerous red vessels, and even spots of extravasated blood, may be observed.\*

In the chronic inflammation of the internal coat, producing the disease called catarrhus vesicæ, the cavity of the organ is found to have undergone a contraction, more or less marked, and contains ordinarily a quantity of turbid urine, the coats acquire an unusual thickness, a consistence like bacon, or a hardness which approaches to horn. From frequent attacks of inflammation, the inner surface becomes rough, and studded with projections, formed by coagulable lymph.\* One of the most common terminations, or consequences of inflammation of the bladder, is

*Adhesion.*—This may take place to any of

\* From stricture of the rectum, Mr Howship has seen its internal surface of the brightest scarlet colour.—*On Diseases of the Urinary Organs*, Case 11th.

† Mr Charles Bell's Quarterly Report, p. 122.



the neighbouring viscera, as the uterus, rectum, jejunum, colon, or the inferior part of the epiploon. From adhesion to the colon when inflated, the disease has been mistaken for distended bladder, \* exciting extreme irritation <sup>there</sup> in the bladder.

*Suppuration.*—When this takes place, it is commonly the termination of inflammation of the inner coat, or the effect of the irritation of stones or ulcers; it may occur to such an extent, as to fill the whole bladder with pus; however, pus in a more circumscribed state, as in that of abscess, occasionally occurs; this may take place at any part of the parietes, or between the coats to any extent, but it is most generally seated in the loose cellular substance about its neck. These abscesses may either communicate with the cavity of the bladder, or with each other, or remain insulated; † large foetid abscesses have been found surrounding the whole bladder between its coats, and separating them into

\* Mr Charles Bell's Quarterly Reports, Part v. p. 37.

† Portal, Cours d'Anat. Med. Tom. v. p. 407.



innumerable laminæ between which it stagnated.\* In a case in the Infirmary of Aberdeen, of abscess near the neck of the bladder, the consequence of a gonorrhœa, suppressed by a strong injection, for twenty-four hours before death the genitals were monstrously swelled and inflamed, and at last sloughed, the patient passed no urine but in drops, and very sparingly. A catheter was once introduced with great difficulty, but nothing came through it, and when withdrawn was very much tarnished. On opening the body, the abscess was found to be about the size of a small egg, the matter intolerably foetid, and the whole mucous coat of the bladder, black and broken down; only a few days elapsed betwixt the suppression of the gonorrhœa, and the death of the patient.

*Ulcer.*—This, like the former, may either be the termination of inflammation, or the effect of the irritation of some foreign body in the cavity. It not unfrequently attacks the

\* Lieutaud, Observ. 1263 and 1264.

NOTE.—See Howship on Diseases, &c. p. 76, for an abscess between the peritoneal and muscular coats.

edges of the wound in lithotomy; it may either be partial or total, superficial or deep; in the latter case, it may form a communication between the bladder and the cavity of the abdomen, or between it and the vagina in the female, and rectum in the male. In these cases, the salutary effect of the previous adhesive inflammation, is seen in preventing the contents of the bladder from being extravasated into the abdomen. The whole internal coat has been found destroyed by ulceration, and the membranous desquamation thrown off by the meatus urinarius, \* leaving the muscular bare as if by dissection. † The case represented in plate 9th, of Marcet on calculous disorders, is an example of this. An ulcer is sometimes seen in the atlantal fundus after a fatal case of lithotomy; this has been ascribed to using too long a staff, and with too great force. ‡ Ulceration, with adhesion of the bladder to the intestines, is the only way in which we can account for foreign bodies being found in its cavity after death,

\* Lieutaud, *Observ.* 1273,—*Medical Essays and Observations*, Vol. I. p. 253.

† Baillie's *Morbid Anatomy*, p. 301.

‡ Dr Thomson's *Lectures*.

or in lithotomy, after having been swallowed months or years before. \*

*Gangrene.*—This most commonly takes place before the rupture of the bladder, in retention of urine; it may however be more extensive, and attack any or all of its coats, but the mucous coat is the one most generally and extensively affected; in this latter case it is most generally accompanied with stones, or some other foreign body; it may, however, take place without any such occurrence. Portal † found all the internal surface covered with livid spots, from using too strong an injection for stopping a gonorrhœa; and on opening the body of the illustrious Barthez, the bladder was found contracted, and filled with purulent matter, its parietes were black, sphacelated, and much thicker than usual, not the least trace of the mucous coat was to be seen. ‡ Morgagni

\* Diction. des Scien. Med. Art. des Corps Etrangers dans la vessie, Tom. vii.

Morgagni de Causis, &c. Epist. 42. obs. 43, &c.

† Cours d'Anatom Med. Tom. v.

‡ Diction. des Scien. Medical. Art. Cystitis.



relates two cases of gangrene of the bladder, which he ascribes to the pressure of foreign bodies in its cavity. The first case is that of a girl, who introduced a hair pin into the bladder, through the urethra; it afterwards formed the nucleus of a calculus, and occasioned two abscesses in the hypogastrium, which on dissection were found to communicate between the peritoneum and abdominal muscles, with the atlantal fundus of the bladder. At this place it was found adhering to the parietes of the abdomen, so that no urine could escape from it into that cavity; the internal coat of the bladder adhered to the calculus, and was found ulcerated and gangrenous in several places. In the other case, the needle had pierced the urethra, and projected into the vagina; the bladder was found sphacelated. \* Gangrene has likewise been found attacking the outside of the bladder, and the peritoneal coat; in this case it was filled with sanious matter. †

\* Epist. 42. art. 20.

† Lieutaud, Obs. 1592, and 1402. and Lib. II. Obs. 331; Bartholinus Acta Med. Vol. 5. Obs. 121, attacking the peritoneal coat.



*Symptoms.*—In cystitis there is pain increased on pressure, both above the pubis, and in the perinæum, accompanied with a fullness there, frequent painful attempts to make water, or total retention with strong desire to void it; pyrexia, sickness, vomiting, sometimes delirium, and from the connection and sympathy of the parts, tenesmus.

No symptoms, a priori, could lead us to the certainty of adhesion having taken place, unless at the same time ulceration had supervened, and a discharge of feculent matter or air had taken place by the urethra, or of urine by the rectum, or vagina; and these without being accompanied with abdominal extravasation.

In the early stages, ulceration is accompanied with pain and difficulty in making water, the urine more turbid than usual, and mixed with shreds of coagulated blood. When pus is formed in the bladder, it will be excreted with the urine, but not so thoroughly mixed with it as if it came from the kidneys; shivering, &c. will likewise occur.

## II.—SCIRRHUS AND CANCER.

May either be partial or total, primary,\* or secondary, but much more generally it is the latter, and extends to the bladder from the neighbouring parts, as the uterus, or rectum. Under such circumstances, the viscus becomes very thick and hard, and exhibits the ordinary cancerous structure; it has been known to grow so hard, as scarcely to be cut with a knife.† Cancer of the bladder is usually attended with a great degree of pain, but instances have been known of a cancerous ulcer destroying all the neck of the uterus and superior part of the vagina, and communicating with the bladder by an aperture an inch in diameter, without the occurrence of any distressing symptom, except a copious foetid discharge.‡ In a case related by Tulpius,||

\* Dict. des Scien Med. Cancer.

† Lieutaud, Obs. 1294.

‡ Dict. &c. art. Cancer Uter, T. iii

|| Lib. iv. chap. 38.

the urine was discharged with excruciating pain, for upwards of ten years, through a fistulous communication between the bladder and rectum; the opening in the former was surrounded with "a foul and unequal carcinoma." Fungi have been supposed to be the common form of cancer of the bladder.\* In Obs. 1267 of Lieutaud, the anterior part of the bladder was ulcerated and besmeared with a thick foetid pus, and looked as if it were carcinomatous; and in the 1303, the scirrhus was confined to the neck, and occasioned obstinate ischuria. In a great proportion of cases of cancer of the bladder, stones or other foreign bodies have been found in its cavity on dissection, or have escaped from it through the communication, which, in all probability, will sooner or later form into the vagina, or rectum.

\* Delpech Malad. Chirurg. Tom. I. Howship on Diseases of Urinary Organs, p. 58, and case 10.



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### III.—DISPLACEMENTS.

The slight displacements which the urinary bladder is subject to, on account of the state of vacuity, or fullness of itself, or the neighbouring viscera, or from pregnancy, or prolapsus uteri, must occur to the mind of every one. A case of fatal retention of urine occurred to Dr Hunter,\* where the bladder was thrust forwards, and upwards, by a large collection of hydatids, situated between it and the rectum. In a case of perineal hernia, which occurred to Mr Broomfield,† the intestines had pushed up the sacral fundus against the os pubis, so that in the operation of lithotomy, he was obliged to introduce the forceps perpendicularly; and pressure on the lower part of the abdomen was necessary to bring the bladder sufficiently low for laying hold of

\* Transactions of a Society, &c. Vol. I.

† Chirurgical Observations.



the stone. In infants, on account of the smallness of the pelvis, from the os sacrum being straight, and the little developement of the other bones, the bladder is almost entirely situated in the hypogastric region, and is prolonged to within a very little of the umbilicus, where it terminates by a kind of point. This might be mistaken for a morbid affection, if it was not known that it is peculiar to children.

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#### IV.—DISTENTION AND RUPTURE.

From whatever cause distention of the bladder has arisen, its position is greatly altered. It may either rise so as to fill the whole pelvis, or reach to the umbilicus,\* and extend laterally so as to fill the iliac fossa,† or it may even rise to the scrobiculus cordis ;‡ in general, however, the distention laterally is greater

\* Lieutaud, Obs. 1254.

† Portal Cours, &c. Tom. V. p. 408.

‡ Bell's Principles of Surgery. Obstruction of Urine.

than that atlantad ; the relative connection of the bladder formerly explained, favours this opinion. Distention of the bladder is accompanied with turgescence of its vessels, fullness of blood in the part, and extravasation into the cellular membrane. “ To those who imagine that the extention of parts in the living body, is like that of the dead, an attenuation or mere dilatation ! who expect to find the bladder on dissection, thin and transparent ! its real condition must appear very surprising. The bladder has not indeed time to grow by an actual deposition of parts, but it is thickened by the fullness and turgescence of its vessels, and by extravasation into its cellular substance. I find always the veins extremely turgid, the muscular fasciculæ big, fleshy like, and apparently injected with blood as in a preparation when the bladder is injected with size, till it is extravasated among the coats. And while much blood is extravasated into the cellular substance of the coats of the bladder, some exudes into the cavity tinging the urine.”\* Portal† considers this thick-

\* Bell's Prin. of Surg. Art. Obstruction of Urine.

† Cours, &c. Tom. v. p. 419.

ening of the bladder, as a thing to be wondered at. Although this thickening of the bladder is the common effect of great distention, yet the coats are occasionally found preternaturally thin. Observation 1255 of Leiutaud, is an example of this ; the distention extended to the umbilicus, and was caused by inflammation of the neck, occasioning retention of urine.

A short time after the bladder is distended to its utmost, if the means of relief prove abortive, inflammation begins at some part of the bladder ; this terminates in gangrene, and the viscus giving way at this point sooner or later, constitutes what has been called

*Rupture of the Bladder.*—When this arises from the above mentioned cause, the aperture by which the urine escapes is small and circular, with a rough, ragged, and black margin. It commonly takes place at the atlantal fundus ; but it may likewise happen at the pubal part, when the urine will be extravasated between the abdominal muscles and peritoneum ; or from ulcers, gangrene, cancer, &c., it may take place at the sacral fundus.



In these cases, a communication between the intestine and bladder is established, and air\* or fœces will be discharged by the meatus urinarius.† This communication of the bladder and rectum has been known to occur as an original malconformation.‡ The bladder may likewise be ruptured by concussion, blows, or wounds. A case of rupture from concussion is related by Sponius.|| A man fell from a height, was seized with severe pain in the right hypochondrium and ensiform cartilage; no urine flowed, except on introducing the catheter; the abdomen swelled, with pain, fever, thirst, and a feeling of straightness in the breast; hiccup and Hypothymea came on. This was thought to be occasioned by extravasated blood in the abdomen. Hence paracentesis abdominis was performed, and six ounces of blood escaped. In two days after he died. On dissection, a great quantity of fluid blood escaped, and the

\* Hennen's Military Surgery, p. 467.

† Edin. Med. Comment. vol. ii.—Memoirs of the Lond. Med. Society, vol. iii. 542—600—643.

‡ Baillie's Morbid Anatomy.

|| Lieutaud, Obs. 1284.

bladder was found ruptured in its fundus, with symptoms of inflammation and gangrene: Observ. 1752 of Lieutaud, is an instance of rupture from a blow. A man received a stroke on the hypogastrium, which produced suppression of urine and swelling of the abdomen; and on dissection, the bladder was found ruptured, with effusion of urine into the abdomen. A simultaneous rupture of the bladder and umbilicus has been known to take place, and the urinary fistula by the umbilicus continue open till the natural passage has been re-established. This has been thought to be owing to the permeable state of the urachus, or to the previous adhesion between the bladder and parietes of the abdomen\*. Let us consider the *urachus*, &c. more particularly. In the foetus, and somewhat less distinctly in the adult, there is a ligament like the remains of a duct, which rises up between the peritoneum and linea alba towards the umbilicus. Although it is a tube in the foetus of the quadruped, communicating with the mem-

\* Delpech. Malad. Chirurg. Tom. ii. p. 246.

brane called alantois, yet it is rarely found pervious in the human subject. Professor Walter\* supposes that the urachus is always open from the umbilicus to the bladder; but shut at the former by mechanical constriction, and that as soon as the muscular fibres, surrounding the entrance of the urachus into the bladder, are dilated or weakened, the urine enters and extends it to a preternatural size, forming in that way a sort of hernia. When the umbilical ring is not strong enough to resist the urine, it is likewise dilated, and either a hernia umbilicalis brought on, or the urine runs out from the dilated urachus. It seems rather more probable that urinary fistula at the umbilicus is formed by the dilated and inflamed bladder forming an adhesion there, and afterwards becoming ruptured; or what is possible, according to Richerand, that the internal coat of the bladder passing through the interstices of the muscular may be prolonged, and open there. A case is related by Richerand† of a girl of 20 years of age.

\* Med. Journal, vol. v.

† Richerand, Nos. Chir. T. iv. p. 330.



who had passed her urine by the umbilicus from her birth, and on examining the meatus urinarius, it was found closed up by a membrane, which being removed, the urine after some time took its natural course.

It occasionally happens in old people, after frequent temporary pains in the neck of the bladder, that the urine daily diminishes in quantity till it entirely stops, and then begins to flow by the umbilicus.\* In the case of a man of 45 years of age, who fell from a height on his abdomen, and where the urine flowed by the umbilicus soon after the accident, Portal found on dissection the urachus of a conical shape; the base, which was situated at the bladder, was an inch and a half broad; and the apex at the umbilicus one-third of an inch; its length was six inches, and its parietes of unequal thickness; the anterior part being four times thicker than the posterior. The anterior parietes were composed of two membranes, and a ligament between them. The internal membrane, or continuation of that of the bladder, adhered

\* Portal sur plus Malad. Tom. i. p. 25 and 49.

strongly about the muscular ring, which embraced it on the side of the bladder; it terminated about three fingers breadth from the umbilicus. The structure was such as is observed at that age, viz. hard, forming a kind of triangular ligament. The external membrane was prolonged on the bladder, and was only a false lamina of the peritoneum.

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V.—BLADDER CONTRACTED, THICKENED,  
AND HARDENED.

These are commonly found combined; but simple contraction, without disease, is found as a congenital affection,\* or in those who die a violent or sudden death. The thickening, and consequent contraction of the cavity of the bladder, are the result of its frequently contracting on small quantities of urine, occasioned by ulcers, strictures, old age, stones, or other sources of irritation, and producing

\* Lieutaud, 1259.

chronic inflammation. This state of disease sometimes proceeds to such a length, that the bladder is found as small, and almost as solid as an orange.\* Camerarius† gives an example of a bladder, the parietes of which were two inches thick, and its cavity the size of a nut. Renaulden‡ has seen it of a hard consistence, callous, and tumified, and almost equal in volume to a child's head, and at the same time its parietes so thick, and its cavity so small, that it could only contain an egg. In an aged woman, Portal|| saw it so contracted, that its cavity could only contain a small nut ; its neck was very hard, like burnt parchment ; the opening by which it communicated with the urethra was totally obliterated, and the parietes were like cartilage. In a case related by Dessault, (tom. ii.), where the parietes were like cartilage, the symptoms so much resembled those produced by stones, that an operation was performed. In the case of dissection of the urachus formerly

\* Bell's Principles, vol. ii. p. 23.

† Ephem. Nat. Curios. Cent. iii. Obs. 40.

‡ Dict. des Scien. Méd. Art. Cystitis.

|| Sur plus Malad. Tom. i.



mentioned, the bladder was very hard, its size did not exceed that of an apple, and it could scarcely contain half a glass of liquid. The neck was very hard, puckered, tough, like half-burnt parchment, and the opening to the urethra entirely shut. The bladder has from gonorrhœa been found so rigid, that it could neither be contracted nor dilated.\*

Some have supposed this thickening of the bladder to proceed from the muscular coat, thinking it the one most subject to disease.† Mr Bell thinks, if it were entirely muscular, the contractile power of the bladder would be destructive; but it is much in the other coats, and owing to a deposition between them. Depositions do sometimes take place between the coats. Portal‡ found a bed of lymphatic substance between the peritoneal and muscular coats, of four lines in thickness, and of a texture so solid, that it looked like cartilage. Some think that the whole coats are thickened, but especially the

\* Lieutaud, 1094.

† Bell's Principles, vol. ii. p. 23.

‡ Cours, &c. tom. v.

muscular;\* and others, that the cellular substance may likewise participate; by others, the mucous coat has been supposed most affected.† Renaulden saw the bladder six lines thick; it did not exceed the size of a small apple; no muscular tunic could be distinguished, only a fibrous tissue, of a greyish colour, could be perceived. Portal,‡ on opening the body of an old man, found the neck of the bladder hard, and totally obliterated; its cavity very much diminished, its parietes eight or nine lines thick, and, on a more attentive examination, he saw the internal membrane was the only one which had acquired thickness. The peritoneal coat was natural, the muscular fibres were scarcely visible, and so intimately united to the external membrane, that they could scarcely be separated. The internal membrane resembled cartilage; it was not of equal thickness throughout, was double at the neck, but especially at the trigone.

\* *Monro's Anatomy*, vol. iii. p. 33.

† *Diction. des Scien. Medical—Cystitis*.

‡ *Sur Plus Malad.* tom. i.

*Symptoms.*—The bladder may be known to be preternaturally distended by the tense elastic swelling which it makes above the pubis, or when felt through the rectum, with frequent calls to make urine. We have seen that adhesion of the bladder to a distended colon, has occasioned the latter to be mistaken for the former. I know of no symptom prior to the introduction of the catheter, which would lead to the suspicion of this having taken place. When the bladder is ruptured, after having been distended for some time, there is a sensation as if something had given way in the abdomen, with a noise, and sudden mitigation of pain, which, however, is soon renewed by the inflammation caused by the extravasation of urine. The bladder may be suspected to be contracted and thickened, if, after strictures, catarrhus vesicæ, ulcers, &c. the patient have frequent calls to make water; and, if upon introduction of the sound, no stone can be felt, and the progress of the instrument be suddenly obstructed by the atlantal fundus, which, with the other parts of the cavity with



which it comes in contact, are felt firm and strongly resisting. The suspicions will be strengthened, if the patient is advanced in years.

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## VI.—CYSTOCELE.

This is oftener consecutive and partial, than primary and complete; it is usually preceded by a distention of the bladder, from retention of urine, from paralysis, which, destroying its tone, renders it flaccid and more easily displaced; or by some other hernia dragging it along with it as a bubonocoele or prolapsus uteri, &c.,\* or by the incumbent weight of the pregnant uterus pressing it to each side. It may present itself in the groin and scrotum, vagina and pudendum, perineum, crural arch,† or umbilicus; the four last are very uncommon. Portal ‡ says, that

\* London Medical Observations, vol. iii.

† Verdier's Memoir, Obs. ii.

‡ Lib. Cet. tom. v. p. 423.

cystoceles at the crural arch, foramen ovale, and ischiatic notch, are very frequent; but for this assertion he neither cites cases nor authorities. It may either be simple\* or compound, single or double,† complete‡ or incomplete. When it is simple, it is commonly at its commencement at the abdominal ring, or in the vagina; when double, it is owing to the pressure of the uterus, and presents at both abdominal rings, or in the vagina and inguinal ring of one side. At the two abdominal rings it has been known to attain the size of a hen's egg.¶ The combined and incomplete cases are the most common; when, considering the anatomy of the bladder, it was mentioned that the peritoneum covers all the atlantal fundus, and a small portion of its sides, that, when distended, this takes place laterally in a greater proportion

\* Diction. des Sciences Medic.—Cystobubon.

† Memoir de l'Academ. de Chirurg. tom. ii. p. 123.

‡ Ruysch, Obs. Anat Chir. 98.

¶ For a case of this in the male, see Verdier's Memoir, Obs. x., and for a double cystocele in the female at the abdominal rings, Obs. xii.

than in the atlantal direction, which is particularly observable in pregnancy, or in those women who have had many children ; that, when rising, it pushes the peritoneum before it, having, of course, the parts opposite the inguinal rings destitute of a peritoneal covering ; this then is a peculiar character of cystocele, that it is destitute of a hernial sac, properly so called.

In old cystoceles, a portion of the protruded bladder will be covered with peritoneum, although, in a case of old cystocele, which came under Mr Pott's care, from the anterior surface of the bladder being the part protruded, it, of course, wanted that covering. It took seven years in descending to the bottom of the scrotum.\* Verdier relates a case, where the urachus and impervious umbilical arteries were drawn into the scrotum ; this case, of course, would have a partial covering of peritoneum.

In cystocele, combined with bubonocoele, whether the former shall have preceded or followed the latter, the bladder will have come

\* Pott's Works, by Earle, vol. ii. and iii.



down with that portion of the peritoneum before it, which forms a sort of pouch, in its reflection from the sides of the bladder; the cystocele will be situated behind this portion of the protruded intestine, &c., and between it and the spermatic vessels.

A case is related by Keate,\* where the spermatic vessels were situated on the external side of the hernia;† but, I believe, that both they and the epigastric artery, for the most part, will be found mesial to the hernia; in other words, the hernia will pass through the inguinal canal in the usual manner; this seems to be the opinion of the French:—  
 “Que le plus grand partie des cystoceles sont du nombre des hernies inguinales externes, ou de celui des crurales internes, presque ils ne sont autre chose que des hernies inguinales ou crurales, formées selon les procedes les plus commun et compliquées seulement d’un déplacement consecutif de la vessie auquel la grande distention de cet organe a donné oc-

\* Cases of Hydrocele.

† Boudon has seen this appearance twice, and Le Dran once.—*Verdier’s Memoir*.

casion.”\* But, if this is not the fact, it may be easily understood how cystocele may occur in old hernia, when, by the long continued pressure, the two rings are brought into opposition, and the opening nearer the usual seat of the bladder; or, it may take place originally as a ventro inguinal hernia. A case is mentioned in Lieutaud, of a fatal strangulated cystocele, in an old man who had been subject to it for twelve years; the only troublesome symptom he had, was occasional difficulty of making water; he was suddenly seized with severe pain in the groin, fever, vomiting, and hiccup, which soon proved fatal. On dissection, the bladder was found partly in the abdomen, partly in the inguinal canal, and partly in the scrotum, adhering strongly. Verdier relates a case of inguinal cystocele, the size of a large melon.† Perhaps the most common kind of cystocele is that which the accoucheur has the greatest opportunities of observing, viz.—

\* Diction. des Scien. Med.—Cystocele.

† Obs. vi.

*Vaginal Cystocele.*—This commonly occurs from violent exertion during gestation, or after delivery. It may descend atlantal to the vagina, or on either side of it, and may be simple or complicated, single or double, partial or complete; when it\* occurs at the sides, it will be situated between the mucous membrane of the vagina, os ischium, and muscles, and if in the posterior part, will have a partial covering of peritoneum. From the intimate and extensive connection between the bladder and vagina at the atlantal part, and between the vagina and rectum at the sacral, vaginal cystocele generally takes a lateral direction; yet two cases are related by Mr Cooper, where it occurred directly under the meatus urinarius. He thinks it arises from a relaxed state of the portion of peritoneum, which is reflected from the bladder to the uterus, and which allows the bladder to yield to the superincumbent weight of the intestines. Garingeot and Verdier likewise relate cases, where it occurred at the atlantal and pubal

\* Clarke on the Diseases of Females, &c.



portion of the vagina. A case of double vaginal cystocele was dissected by Mr Burns, where the tumour formed on each side of the urethra. The oblique direction of the axis of the pelvis, renders this hernia less frequent, than it otherwise would be. When it still continues to protrude, it will descend into the labium, forming

*Pudendal Cystocele.*—In this case it passes the edge of the levator ani, or between its fibres, and appears in one of the labia. Mr Cooper relates a case where it attained the size of a pigeon's egg, accompanied with symptoms of strangulation. In a patient of Mr Burns, it protruded between the origins of the levator ani, and obturator internus.\*

*Perineal Cystocele.*—In the male subject, the cystocele will probably pass between the fasciculi of the levator ani, or between that muscle and the sphincter, and form a tumor in the perineum. In a case of perineal hernia related by Mr Cooper, in which the blad-

\* Edin. Med. and Surg. Journal, vol. iv. p. 512.

der covered an inch and three quarters of it, the lower extremity of the sac was placed before the anus, the prostate gland was situated immediately anterior to the fundus of the sac, and the fundus of the vesiculæ seminales was placed upon the lateral part of the sac, and its apex was situated more anteriorly. The rarity of this kind of hernia, may be judged of by a question of Rieherand's, who asks, if perineal cystocele is any thing else than a dilatation of the bulb of the urethra.\* In the female, the anatomy of this kind of hernia, will be still more intricate, as, before the bladder can arrive at the perineum, it must turn round the neck of the uterus, and descend by the side of the vagina.†

*Congenital Cystocele.*—Cystocele is sometimes, though very rarely, found as a congenital affection. A case of this kind is quoted from Stoll, in Mr Wishart's translation of Scarpa on Hernia, and in the Memoirs of the Academy of Surgery,‡ mention is made of a case of

\* Nos. Chirurg. Tom. iii. p. 500.

† Verdier's Memoir.

‡ Tom. ii. p. 15.

hernia vesicalis, which a man had from his earliest infancy, and which becoming strangulated, caused his death. Facts in support of this kind of hernia, are to be found in Arnaud's paper.\*

*Symptoms.*—Whenever cystocele presents itself, it may be known when the bladder is distended by a fullness and elasticity of the parts which go off when the patient has made water; if it does not entirely disappear, the pressure of the hand, and laying the patient on his back, will make the water return into that portion of the bladder which is situated within the abdomen, and will excite the desire to evacuate it; this, with the deviation of the canal of the urethra (if the cystocele is a crural one) towards that side on which the hernia is situated,† the dysuria and occasional retention, and other concomitant circumstances, will be sufficient to distinguish this affection, especially if a stone can be found in the tumor, which is sometimes the case. There is

\* Verdier's Memoirs, p. 79.

† Dict. des Scien. Med. Cystomerocele. Verdier's Memoir, obs. 11th.



a watery tumor which sometimes occurs in ascites, to such an extent, as to produce obstruction to the flow of urine, and strangury. This might, perhaps, lead to a mistake of its being a case of vaginal cystocele, the concomitant circumstances, and there being no desire to make water, or flow of it, when the tumor is pressed, were not attended to. It has been mistaken for procidentia uteri, but in this, the cervix uteri at the bottom of the tumor, and the absence of the stomach complaints, which usually attend the latter, will assist in the diagnosis, as will likewise the pain referred to the umbilicus.\* When cystocele occurs at the pudendum, it is said to have been mistaken for bubonocoele, but the direction of the hernia into the vagina, and the free state of the ring, and upper and outer part of the labium, will easily undeceive the practitioner. If it occurs during labour, or before it, care must be taken to distinguish it from the membranes. It may be mistaken for swelling of the lacunæ on the inside of the

\* C. M. Clarke on the Diseases of Females which are attended with discharges.

labium, but this labial tumor does not dilate on coughing, and is not affected by change of position ; it cannot be traced entirely into the cavity of the pelvis, and the os ischium can be felt behind it.

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#### VII.—CYSTS, &c.

These are pouches or bags which appear on the inside or outside of the bladder, and may communicate with its cavity by a small or a larger orifice ; they may be formed by all the coats of the bladder, or, what is more common, by the protrusion of the inner coat, through the interstices of the muscular, forming what Walter calls *hernia vesicæ*.\* They have even been known to occur externally, without any communication with the bladder ; they are often the receptacles of stones, which may either be contained in separate ones, or collected in them in numbers. Cases of this

\* Medical Journal, vol. v.

kind, says a late writer, have been more talked of than seen.\* A cyst was observed by Home,† in the posterior portion of the bladder, of the size of an orange, situated above the prostate gland, and communicating with the bladder by a small orifice of the size of a goose quill; its coats were of the thickness of a common bladder, and covered on the inside with coagulable lymph. In Heister's 32d plate, there is the representation of a sacculated bladder, which, viewed externally, looks as if a number of tumors about the size of oranges were growing from it; and in the 7th plate of Home on the Prostate, there is the representation of a sort of cyst, which could contain about a half a pint of urine. It was formed by the inner membrane of the bladder, which protruded to this degree between the opening of the ureters, by the efforts of the muscular coat.‡

\* Bell's Quarterly Reports, iv.

† On the Prostate.

‡ Note.—The same symptoms as those of stone, have been known to be produced by this transverse valvular fold of the inner membrane across the neck opposite to the orifice of the urethra. Howship, &c. p. 71.



Boudou\* mentions a case of an encysted stone in the bladder, where lithotomy was performed, and, on dissection, the stone was found only detained in its place by the portion of the peritoneum, which covered that part of the bladder. An analogous case to this is mentioned by Mr C. Bell,† the peritoneum covering the bottom of the sac, was inflamed, and seemed to threaten ulceration; and the edges of the orifice of communication between the sac and the bladder were ragged, as if ulcerated.

What has been called *Double Bladder*, seems to be nothing more than an uncommonly large cyst, caused by the protrusion of the inner membrane, through the interstices of the muscular fibres, although Dr Baillie supposes that there is a marked growth of the inner membrane, forming a ridge at some particular part, and at length, by a continuation of this process, making a septum more

\* Memoire de l'Acad. de Chir. tom. i. p. 424.—Portal, Lib. Cit. tom v.

† Quarterly Reports, p. 445.

or less complete in the bladder. They are known to be real cysts, by the ureters and vesiculæ seminales belonging only to one of the sacs. The cyst may be disposed, so that the septum may be either in a longitudinal,\* transverse,† or oblique‡ direction, with an opening of communication of greater or less magnitude. In these cases, the supposed cyst has been found with its parietes much thinner than those of the real bladder.§ In the 1300 Observ. of Lieutaud, the bladder was thick and contracted, and at the left side appeared perforated, and ending in a sac, larger than a common sized bladder. An example is on record of two such large cysts being found, that they put on the appearance of a triple bladder; the middle sac, which was considered as the true bladder, was larger than that on the left, and less than the other on the right.|| An extraordinary instance of a mor-

\* Verdier's Memoir, Obs. xviii.

† Baillie's Morbid Anatomy.

‡ Verdier's Memoir.

§ Ditto.

|| Do. Obs. xix.

bid affection, resembling a double bladder, occurred to Mr Foubert, on opening the body of an old officer. “ In the hinder and upper part of the bladder, a pit, or depression of a conical figure, was discovered with the sides tending inwardly, a portion of the intestinum ilion, near half a foot long, was lodged in this depression ; and, on opening the bladder, he found that the point of the cone advanced as far as its neck.”\* The double bladder, or the bladder divided into two chambers, has been supposed to occur now and then as a temporary affection, caused by a strong contraction of the muscular fibres at some particular part ; it then receives the name of the hour-glass contraction, being analogous to an affection which sometimes takes place in the uterus, and which has received that name.

*Symptoms.*—We can never determine a priori, whether a bladder is sacculated or

\* Verdier, Obs. xx.—Bell’s Quarterly Report, p. iv.—Med. Museum, No. 40. triple bladder.—Memoirs Med. Society of London, vol. i. interesting case of double bladder.



not ; but if the sac, or sacs, contain a stone, then, with the assistance of a sound, a probable conjecture may be formed. But more of this hereafter. When the case of an uncommonly large cyst occurs, so as to resemble a second bladder, a conjecture of its formation may be indulged, when there is a considerable circumscribed tumour above the pubis, which is not diminished on making water, except in a particular position, and then to the immediate relief of the patient.

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#### VIII.—ANTERIOR PART WANTING.

This is a congenital affection, which consists in a deficiency of the anterior part of the bladder, with a protrusion through it of the posterior part, and likewise a deficiency of the abdominal muscles. It generally makes its appearance in the form of a pale red, or dark livid tumor, varying in size from that of a nut to that of the fist. It is generally

situated at the lower part of the hypogastric region, but it has been known to appear as high as the umbilicus. The tumor is commonly a spongy, vascular mass, of an unequal granular appearance, deprived of cuticle, and not particularly sensitive when touched ; its surface is constantly bedewed with a ropy mucus, which defends it from the acrimony of the urine, constantly passing over it from the ureters, which open on its surface about the transverse diameter in infants, but gradually descend, so, that in adults they are found at the sacral edge. They are commonly very much distended ; in a case related by Mr Cooper, they were found larger than the rectum. This malconformation occurs far more generally in males than females, and it is commonly attended with a deficiency of the bones of the pelvis at the pubis, which are usually in such cases connected by a strong membrane, and there is either a separation or deficiency of the recti muscles at the place where the tumour protrudes. One case has occurred, in which this deficiency of the bones of the pubis was supposed not to take place, no symp-

tom of it being apparent on external examination.\* A malconformation and position of the genital organs likewise takes place ; those of both sexes have been known to be situated as high as the usual situation of the umbilicus.† The tumour cannot be reduced or diminished by pressure, yet it has been observed of a small size in the morning, gradually increasing in the course of the day ; it sometimes varies in size to more than half its volume, upon any exertion, especially crying. In very rare cases, the skin has been known to cover the tumor ; this was supposed to have taken place in the case of Mr Penchinati.‡ It has been known to take place in a case of a mixed nature, between extroversion of the bladder and epispadias.¶ The case in which this occurred, was that of a conscript ; the tumour was about half the size of a ren-

\* Mr Coates, Edin. Med. and Sur. Journal, vol. i.

† Dr Duncan's Paper, do.

‡ Dr Duncan's Paper.

¶ The former is what we are now considering, the latter is where the urethra is found at the superior part of the penis.



net apple, soft and livid, situated in the region of the pubis, between the symphysis ; it was covered with puckered integuments, disappeared on pressure, returned again when it was removed. The urine did not come from the ureters, opening on the exterior surface of the tumour, but they appeared to open near to the semi-canal which appeared on the surface of the penis, at the neck of the bladder.\*

The *symptoms*, in such cases, are sufficiently obvious, and need not to be recapitulated. The urethra being always imperforated, and the impossibility of reducing the tumour, render hopeless all means of cure by compression, suture, &c., though Delpech supposed it might sometimes be thus effected.

\* Dict. des Scien. Med.—Epispadias.

## IX.—FOREIGN BODIES IN ITS CAVITY.

1st. *Stones*.—The causes which determine the precipitation of the salts of the urine, and the formation of urinary calculi, are totally unknown. The comparatively rapid formation of them on the introduction of a foreign body into the bladder, might lead us to suspect something analogous to the process of the formation of crystals out of the body, when a nucleus is presented for that purpose, but it does not always take place in the bladder under such circumstances, nor does it occur so suddenly, nor so regularly; indeed, a true regular crystallized structure never takes place in a calculus, although crystals are frequently formed on the surface, and occasionally in cavities throughout; very rarely a cavity is seen in the centre of the calculus, filled with crystals;\* these are usually crystals of triple phosphate. Instances frequently oc-

\* Dr Thomson's Lectures.

cur of large calculi being found in the bladder after death, without any thing having happened during life, to give rise to a suspicion of their existence, and without the least appearance of irritation in the bladder being perceptible on dissection.\* Even patients, subject to gravel for years, often die without any stone being produced in consequence. The most robust are liable to this complaint, but it more generally attacks children and old people, than others, and males more frequently than females. The comparative width and easy dilatation of the urethra in the latter, and its straightness and shortness, will, in some measure, account for its occurring less frequently in them, for this structure allows the stones to be more easily evacuated. In females, stones of several ounces have been extracted by the urethra; and Tulp† relates a case, where 300 calculi were excreted at the same time with the urine.

The formation of calculi has been occasionally observed to be hereditary, and to attack those

\* Howship, Lib. Cit. p. 62.

† Lib. ii. cap. 47.



afflicted with gout. It seems frequently to be owing to a peculiar diathesis ; the same individual having been frequently cut, and yet the introduction of a foreign body seems not to need such aid. Disease of the prostate may conduce to their formation, by retaining small quantities of urine in the pouch, necessarily formed by the projection of the gland.\* From the less frequent occurrence of the disease in tropical climates, there is probably some connection between the functions of the skin and those of the kidneys.† Depositions of calculous matter often form in the bladder, after its coats have been injured by a wound, and to such a degree sometimes as nearly to fill it ; and seemingly these calculi have no nucleus.‡ Calculi vary in their size from that of the smallest pea to sixteen inches in length, and from the weight of a few grains to that of several pounds. The 1323 Observ. of Lieutaud is a case of a calculus so hard as to strike fire with flint, and which weighed 3 xxxii.

\* Home on the Prostate.

† Marcet on Calculi.

‡ Hennen's Observ. on Military Surg. p. 470.

The very large one mentioned above weighed 3 xliv.\* They may exist in the bladder unconnected with the neighbouring parts, or they may adhere to its parietes, and that so strongly sometimes, that in their extraction the bladder has been torn ;† or they may adhere to a fungus growing from it ; or be situated between its coats, or in cysts connected with them. In a case which occurred to Mr C. Bell,‡ the sac was situated near the neck of the bladder ; was about two inches in diameter, and was connected with the bladder by an opening of a quarter of an inch in diameter. The stones in these cysts, although numerous and small, sometimes attain so large a size as to weigh 3083 grains.|| They are usually very smooth on the surface ; this is commonly ascribed to attrition ; but it has more lately been supposed to be owing to their being contained in separate pouches.§

\* Philosoph. Transact. 1809.

† Tulpius, lib. iii. cap. 5.

‡ Quarterly Reports, vol. iv.

|| Marcet on Calculi.

§ Dr Thomson's Lectures.

Urinary calculi are divided by Wollaston into five species. 1st, That composed of uric acid. 2d, The ammoniaco magnesian phosphate, or fusible calculus. 3d, The oxalate and phosphate of lime, or mulberry calculus. 4th, The phosphate of lime, or bone earth calculus. And, 5th, The cystic oxyde. Sometimes calculi are entirely composed of the first species, and are of a nut brown or yellow colour, of a lamellar and radiated texture, and are smooth. The second is seldom entirely composed of its elements; but is more generally blended with uric acid, or phosphate of lime; although layers of these sometimes cover a uric acid calculus. This calculus is distinguished by its softness and smoothness, its white colour and lamellated texture. The white powder, which is precipitated from the urine of some patients labouring under calculi, is commonly composed of crystals of the phosphate of ammonia and magnesia. The calculus composed of the oxalate and phosphate of lime, is of a dark brown, black, or deep purple colour, with an uneven protuberating surface, as its name imports; it is often grey within, hard and



heavy. Phosphate of lime sometimes composes the entire substance of a calculus; although more frequently it is mixed with uric acid, or the phosphate of ammonia and magnesia disposed with them in layers. It is of a pale brown colour, very smooth, and with a laminated texture. Dr Davy\* has seen a calculus of phosphate of lime, with 20 per cent. of water, and no appreciable animal matter. The cystic oxyde is a kind of calculus which occurs very rarely, there not being above four or five specimens of it to be found. It is yellowish, semi-transparent, and glistening, not distinctly chrystallised or laminated, and resembles the calculus of the phosphate of ammonia and magnesia. A calculus has been supposed to exist of urate of ammonia; it is less sensibly striated, and its colour is lighter than the pure uric acid calculus; it exhales a smell of ammonia, and dissolves in alkaline solutions. Dr Marcet doubts the existence of this calculus. He describes two other kinds of calculi; one, *sui generis*, to which he proposes to give the

\* *Monro's Anatomy*, vol. iii.

name of zanthic oxyde ; it forms a lemon-coloured precipitate, when acted on by nitric acid. The other corresponds in all its properties to fibrine. Carbonate of lime has likewise been found to constitute calculi. Silix is sometimes found in calculi ; but so rarely, that out of 600 which Fourcroy examined, only two were found containing it. Besides these constituents of calculi, an animal matter, analogous to albumen, is frequently found. It appears to give them colour and consistence ; it is present in largest quantity in the mulberry calculus ; but it is also found in those which are white and crystalline. An unusually large quantity of it was found in the large calculus of triple phosphate formerly mentioned. Calculi are sometimes situated at the neck of the bladder, with a long process projecting into the urethra. They have likewise been found of a circular shape, pierced with many holes, or with only one in the centre.\* In urinary fistulæ, calculi are sometimes found generated in the passage from the infiltration of urine.

\* Morgagn. Lib. Cit. Epist. 42. Art. 10, &c.

An example of this kind occurred after the battle of Waterloo from a wound of the bladder. The calculus was found in the fistulous passage, near the external wound, having a splinter of the bones of the pelvis as a nucleus.\* A case nearly analogous occurred to Portal.† The calculus was found in the passage of a fistulous communication between the bladder and rectum ; it was rough, with two flat sides, of a grey colour externally and internally, and was easily reduced to powder. It was of the size of a pigeon's egg ; two small oblong openings were found in the sacral fundus of the bladder, which opened by fistulous passages into the perineum. For the most part, calculi have a nucleus, or something upon which they were originally formed ; any thing introduced into the bladder, and remaining there may become so : Prune-stones, hair-pins, sewing and knitting needles, nails, pieces of bone, wood, lead-bullets, canulæ, ends of bougies or catheters, brass-wire, hair, blood, flints, pieces

\* Dr Thomson's Lectures.

† Cours d'Anat. tom. v. p. 416.



of dressing, ears of corn, &c.\* Dr Baillie has met with two instances, in which a matter like mortar was contained in the bladder. He considers this matter as the same with that of calculi. The disease had continued many years, and was connected with chronic inflammation of the internal coat.

The effects of calculi on the bladder are those in common with any foreign body, chronic inflammation of the mucous coat, ending in ulceration or gangrene;† thickening of the muscular coat, produced by the increased action from the very frequent calls to make water, occasioned by the excess of acid in the urine, and the irritation of the stone on the mucous coat. There is likewise an increased and vitiated secretion of the mucus of the bladder; sometimes pieces of membrane are voided, covered with small stones;‡ occasionally the irritation advances to such a height, that pus and blood are ex-

\* Dict. des Scien. Med. des Corps Etrangers dans la vessie; and Portal, Lib. Cit. v.; and Morgagni ut Cit.

† This gangrene Mr Howship ascribes to debility, and not to inflammation.—*Diseases of Urin. Organs*, p. 77.

‡ Tulpius, Lib. ii. Cap. 48.

creted with the urine; and at the places where the irritation has been most severe, fungi sometimes arise.

*Symptoms.*—The symptoms which are supposed to indicate stone in the bladder, prior to the introduction of the sound, are very ambiguous, and are modified by its situation being more urgent, the nearer it is to the neck. When situated in the sacral fundus, they have been known to give rise to such symptoms, that no disease was suspected in the bladder; but were all referable to disease and ulceration high up in the rectum.\* The most common symptoms are frequent inclination to make water, which is mixed with mucus, and difficulty of retaining it; it frequently and suddenly stops, with pain at the glans penis, especially as the last drops are voided. This continues for some time, and is attended with a sense of weight or pressure in the bladder. Tenesmus, itching, and uneasiness about the anus also attend, with a numbness of one or both thighs, and retrac-

\* Howship, Lib. Cit. p. 62.

tion of the testes. The pain attending this affection is not constant; but comes in paroxysms, and is increased, and the urine rendered bloody on any rough motion. The urine exhales an ammoniacal smell; and towards the latter end of the disease becomes black and putrid. In an early stage, a white or pink-coloured sediment is observed in it, denoting the presence of a calculus of ammoniaco-magnesian phosphate, or of uric acid. If portions of calcareous matter like mortar be mixed with it, then the presence of such a substance in the bladder is ascertained. The symptoms of incysted stone will not be so severe; indeed, stones are thus frequently found on dissection, where none had been previously supposed to exist; neither can the knowledge of them be attained without the assistance of the sound. There may be supposed to be one sacculated, if it is not found to change its place, or stop the urine while it is flowing; when in sounding it is felt always at the same point, retires if the bladder be full, and approaches, if it be empty; and when, after many trials, it is impossible to get the sound round the stone, but only to touch



it. Various other substances, besides stones and tumors, are found in the bladder; but they have been mostly enumerated under nuclei. It has not unfrequently been found filled with pus from the irritation of stones, &c. &c.

2. *Hair* has not only been found in the bladder on dissection, but has been known to be passed by the urethra during life, both as single hairs, and as several from the same bulb. A case of this nature, I believe, has been seen by most practitioners in town. It occurs in the person of a man who is above eighty, and who has been subject to it for about twenty years; but here it does not come at the time of making water, but in the intervals; neither does it observe any stated period, for sometimes as much will come away in a week as had taken a month before. Tulpius mentions a case of it occurring periodically, viz. every fortnight, and continuing for four days at a time, and attended with a good deal of pain; it lasted in this manner four years, with incontinence of urine; during the period the hairs as they came away were found involved in mucus. In 1262 Obs. of

Lieutaud, a case is mentioned of a woman of sixty-two, who was afflicted with weight in the abdomen and frequent strangury; a catheter was introduced, and a pound of pus mixed with urine came away; fainting, diarrhoea, and vomiting came on, which soon terminated in death. On dissection the bladder was found of a green colour, adhering to the uterus; it contained various fragments of bone, and a small round ball composed of hair swimming in purulent matter. This mixture of hair with pieces of bone bears some analogy to what we sometimes find in the ovarium of unmarried women. In some instances the analogy is still more complete, for it has been found bound together by that foetid greasy matter, which is the case when it occurs in the ovarium; the following is an example of this:—A woman aged twenty-four was delivered of a dead child, and died six days after of a malignant putrid fever. On dissection, the bladder was found very much distended, and about one-half of it in a

\* Bulletin de la Faculté de Médecine, No. IV. p. 58. 1808.

state of mortification ; it was filled with a thick and foetid matter, mixed with hair, which was united into an oval mass, accommodating itself to the form of the bladder. This mass, with the matter which adhered to it, was five inches long, and three broad ; when the hair was washed, cleaned and dried, it weighed 3ii ; on cutting into the tumor there was found an osseous substance, and another in small quantity which resembled the brain ; the length of a hair was generally from four to 12 inches.

3. *Worms*.—Various kinds of insects have at different times been found in the bladder, but worms are the most common, and of these the common intestinal round worm, and ascarides, are the most frequent. Tulpius has observed a kind of a middle nature, between the latter and those found in putrid cheese ; and has likewise seen several of those last. Inspissated mucus and coagulated blood, have at different times been mistaken for worms. The following is a description from Tulpius, of an insect voided with the urine : “ From an obtuse and broad head, (from which pro-



truded two small horns) sensibly terminating in a pointed tail, the apex of which was black and sufficiently conspicuous in those living. But on the convex part or back, they were round and smooth, but depressed in the belly, rough and like millipedes, furnished with innumerable feet." In a case mentioned by Mr Lawrence,\* the largest were from four to eight inches long, the smallest were semi-transparent, when first voided, but became opaque when immersed in spirits; they were of a round form, pointed at the two ends; the larger ones appeared so contracted in the middle, that they looked as if broken, but from this point they increased gradually towards either extremity, when they again decreased. In this case there was about 1000 worms passed by the urethra; and previous to their appearance, very anomalous and painful symptoms were present; that of a body moving in the bladder, being the only one which could throw the least light on the matter. Tulpius relates a fatal case, which

\* Medico-Chirurg. Transact. vol. ii.  
Medical Essays, vol. vi.

he ascribes to the presence of a red worm in the bladder.

4. *Hydatids*.—These are occasionally found in the bladder, either adhering to it or loose, or between its coats; they are generally full of limpid water, but sometimes they contain a glairy viscid matter; they produce the usual inconvenience of foreign bodies in this viscus.

5. *Varicose Veins, &c.*—These are generally confined to the internal coat of the bladder, and may either extend all over its surface, or be confined to a particular part, as the neck; it has been said that these may exist, to such a degree as to cause retention of urine. Delpech\* denies that even a dilatation of the vessels of the bladder can exist to such a degree as to cause this without catarrhus vesicæ, tumors, or some other disease of the bladder, existing at the same time. When retention does occur from dilatation of the veins, I suspect it will more generally be found to arise

\* Malad. Chirurg. Tom. i. p. 568.

from those large ones situated in the loose cellular substance at the neck on the outside. Hæmorrhage from the vessels of the bladder, may be the consequence of wounds, falls, or blows on the belly, or perineum; it has been considered as a thing to be wished for, in certain circumstances, as in cystitis, hæmorrhoids, &c.\* I should rather suppose that it should be prevented by all possible means, as a highly dangerous affection, and one which is not easily commanded, as the outlines of a case which occurred to an eminent practitioner here will shew.† Catheters having been employed to dilate a stricture, after their use had been persevered in for some time, and the stricture nearly cured without any difficulty having been experienced, or an unpleasant symptom having previously taken place, blood was observed to come away with them, after one of the insertions; this increasing and coagulating in the blad-

Portal Cours, etc. tom. v. p. 411.

† See likewise Howship on Diseases of the Urinary Organs, page 60. In this case, the coagulum filled the whole bladder, and was the immediate cause of death.



der, caused partial retentions of urine ; larger catheters to allow of the more easy exit of the blood, and unusually long ones to penetrate the coagulum, and arrive at the urine were employed, but with little benefit ; at last, almost total retention took place, with elevation of the bladder into the hypogastric region, attended with pain and fever. These symptoms being alarming, as a last resource a strong large brass syringe was adapted to the catheter, and several ounces of blood sucked out, to the immediate relief of the patient. This treatment, with the use of cold applications, was persevered in for some time with ultimate success.

6. *Tumors*.—These may be either of a steatomatous, scirrhous, polypous, or fungous nature, and may be attached to any part of the bladder, external or internal ; the scirrhous and polypous, are very rare, especially the latter : this may be attached to the bladder, either by a small or large neck : \* it occasionally attains such a size, as to fill the

\* Portal Cours d'Anatom, Tom. v. p. 410.

greater part of this viscus, \* it is pretty firm in its texture, and consists of various projecting masses. In a case of polypous tumor of the bladder, which occurred to Professor Walter, † it adhered to the neck, and protruded through the urethra, out of which it extended in the form of a fleshy concretion. The scirrhus, like any other tumor, may be situated at the neck, or at the entrance of the ureters, so as to speedily prove fatal. The 1287 Obs. of Lieutaud, is a case of this kind; when the catheter could not be introduced on dissection, the bladder was found like moistened paper, tore with the slightest touch, and contained a large quantity of mucus, and much sandy matter; a callous carruncula was situated at the sphincter, which shut up the meatus urinarius. These like the former, often attain such a large size, as to fill the whole bladder ‡, and are covered with varicose veins. It has been supposed that they sometimes degenerate into cancer,

\* Lieutaud, Obs. 1300.

† Med. Journal, vol. 5.

‡ Lieutaud, Obs. 1302.

for patients have been observed to void foetid matter with their urine, and on dissection, similar foetid cancerous matter has been discovered in the bladder, along with a scirrhus tumor.

*Sarcomatous, Steatomatous, and Fungous Excrescences.* The internal membrane of the bladder, like all those which have the same structure, is subject to fungous growths; they are most commonly situated about the trigone, and take the shape of a mushroom. In Obs. 1124 of Lieutaud, is a case of steatomatous tumor in the bladder, near to the neck, which extended upwards to the ureter, which it compressed, so that no urine could enter the bladder. In the bladder of a woman of forty-five, Walter found a flesh coloured, fibrous, soft mass, extending over the whole cavity and adhering to its coats. It consisted of a gelatinous matter, with ammonia, lime, muriate of soda, and a little oil. These fungous excrescences are of a loose fibrous structure, and they have sometimes been extracted along with calculi, without the practitioner suspecting it till it was en-



tirely separated. Tulpius\* mentions the case of a woman who passed fatty matter by the urethra. Might not this be from a tumour in the bladder, separated by previous mortification, and now undergoing decomposition ?

Irregular processes are sometimes observed hanging from the internal surface of the bladder ; they are either membranous,† or consist of coagulable lymph, from previous chronic inflammation ; or they appear as elongations of the inner membrane ;‡ these, when cut into, are found to consist of a considerable quantity of cellular membrane, intermixed with a little fat.

*Symptoms.*—Tumors in the bladder are not accompanied with any symptoms which are not referable to other diseases, or other foreign bodies in the same viscus. When they are situated near the neck, they may occasionally be perceived, and in the female made partially to protrude by straining ; or they

\* Lib. iii. chap. 19.

† Bell's Quarterly Reports, No. IV.

‡ Baillie's Morbid Anatomy, p. 303.

may be suspected to be present by the feeling communicated to the hand through the medium of the catheter or sound.

*Fungus Hæmatodes*—Has likewise been observed to attack the bladder, and by some has been considered as the only disease which attacks it as a primary affection.\*

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The preceding observations on the Anatomy of the Bladder, lead our attention to some points of practical importance, which the limits of a paper of this nature will not allow me to enlarge upon; therefore I shall only mention a few of the most obvious, as the very small space at the sacral fundus allowed for puncturing from the rectum: this space is least when the parts are in situ; for when the bladder is removed from its connection or dried, the cellular substance which connected the vesiculæ seminales to it being

\* Howship on Diseases, &c., pages 68 and 129.

destroyed, allows them to fall down, and thus a larger space appears than would otherwise be the case. Hence the importance of studying parts in their relative connection. The bladder, in rising above the pubis, leaves a space of two or three inches destitute of peritoneum ; allows (if not a less dangerous, at least) a larger vacant space where it may be punctured. It is of some importance to recollect, that when this organ is distended, the increase of capacity is greater at its sacral fundus or base, than in its body.\* That the bladder in infants being of a pear shape, and extending to the umbilicus, there is not much fear of wounding it in the operation for imperforated anus. In lithotomy, sounding, catheterism, and puncturing from the rectum, it must be recollected, that sometimes the sacral fundus of the bladder is a good deal lower than its neck, sometimes on a level with it, and occasionally even higher ; and that, in a few instances, the peritoneum has been observed placed obliquely, and partially covering one of the vesiculæ.† It is

\* Colles' Surgical Anatomy.

† Monro's Anatomy.



likewise of importance to recollect the direction necessary to be given to the catheter, when it is found necessary to introduce it in cases of procidentia uteri ; for here the bladder forms a portion of the external tumor, dragging with it the meatus urinarius ; so that, in order to introduce a catheter, the point of the instrument must be turned towards the knees of the woman, otherwise it will enter the passage, but not reach the bladder.

FINIS

